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ABSTRACT

This document is a guide to sources of information on endangered species distribution in Michigan. It was prepared for CETA (Comprehensive Employment and Training Act) students who will collect the documents. The guide is divided into three major sections. The first section includes an introduction (briefly discussing endangered, rare, threatened species and types of literature on the subject) and a historical overview of the development of natural history record-making in Michigan. The second section consists of eight chapters, an introductory chapter which introduces general sources and provides rationale for the strategies of their use, and chapters listing and discussing sources useful for researching endangered species in eight phyla listed by the Department of Natural Resources (mollusks, insects, fishes, amphibians/reptiles, birds, mammals, plants). A similar format of presenting materials in each chapter is used: handbooks, guides, texts; books/articles; indexes; journals; associations/agencies; Library of Congress Classification of materials; and a systematic presentation of species within each phylum. The third section is a series of directories useful for collecting current information. These include associations and agencies, Michigan college biology departments (which keep field records of local flora and fauna), and Michigan nature centers. (Author/JN)

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A GUIDE TO THE RECORDED DISTRIBUTION OF ENDANGERED, THREATENED AND RARE SPECIES IN MICHIGAN

Providing a bibliographic discussion of the subject, annotated list of reference sources and directory of local nature associations, centers, agencies and university field stations

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Summer Quarter, 1977

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PREFACE

The "Michigan Endangered and Threatened Species Program" was created in 1975 by the Department of Natural Resources to study and evaluate the current status of local rare species in a multi-step project. These steps may be briefly summarized as to: assemble a list of proposed endangered, threatened and rare species (tentative list was issued in December, 1976); collect written records of specie distribution in Michigan; conduct field surveys based on former distribution patterns; and evaluate data to implement methods of conservation and initiate protective legislation for threatened species.

It was a fortuitous coincidence for me to become aware of this program during the annual meeting of the Detroit Audubon Society in March, 1977, while I was searching for a theme for my final course in library science. Inspired by her lecture, I contacted Dr. Sylvia Taylor of the "Endangered Species Program" and volunteered my services to prepare a guide to the sources of information on biological surveys in Michigan. With the approval of Dr. Booth, dean of the School of Library Science at Wayne State University, this paper will fulfill the requirements for the course 7499, Master's Seminar and Project (4 credits).

Herein is presented, as the title suggests, a "guide to the sources" of information on specie distribution in Michigan. It was prepared with the intent to be used by CETA (Comprehensive Employment

and Training Act) students, who will actually collect the pertinent documents. In preparation for their work, I have tried to create a descriptive landscape of biological observation in Michigan: tracing the historical development from early exploration to the establishment of research centers; filling in the scientific journals and outstanding publications as they appeared; and finally offering a tableau of naturalists whose daily observations constitute a large resevoir of unpublished sightings. I have attempted to be as comprehensive as possible in orienting the researcher to the field. As this paper was planned as a first step in research, it cannot claim to be complete, but hopefully, the methods and samples given will supply solid grounding for further investigation. Any flaws in interpretation or citation are soley my own doing.

Many thanks are extended to the people who have helped me on this project, particularly my advisor, Mr. Keresztesi, whose guidance and instruction have been much appreciated.

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SECTION ONE

CHAPTER ONE

Michigan has many unique aspects: it contains an excess of 100,000 lakes, including the world's largest fresh-water lake (Superior). It spans a rich variety of terrain from sand dunes, prairies, and taiga-like bogs, to pine-covered mountains and hardwood forests. Because of this, Michigan also provides habitats for a wide range of organisms, some of which are so sensitive to their environment, that any changes in territory may threaten their existence.

In order to moniter and protect any critically-challenged organisms, the "Endangered and Threatened Species Program" was created by the Michigan Department of Natural Resources, and a list of species for consideration of protection has been prepared by advisory committees of experts. The next step for the program is to discover and verify the localities where these organisms have been sighted, and if possible, determine the natural population level/carrying capacity of that species in the area. With this information, the field workers on a near-future survey of the state will be alerted to study special areas, and compare present population levels with those of the past. These comparisons will also be useful in determining the point when an endangered species has become restored and stabilized.

The proliferation of terms for "endangered, threatened, and rare" are used for more than dramatic effect. The different catagories

refer to differing levels of scarcity and decreasing legal status. Briefly, "Endangered" species are listed by the Department of the Interior and receive automatic legal protection and Federal support. A "threatened" species is given protection through state legislation and "is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." Finally, a "rare" species has no legal protection, but is extremely uncommon in Michigan. Within this last catagory also falls the formerly endangered species that have rebounded into stable populations.

For our purposes, all species on the list will be researched alike, but it should now come as no suprize that we will locate nationally-published reports on "endangered" species. For brevity in this paper, I will often refer to "endangered, threatened and rare species" as "threatened."

Let us look bibliographically at the composition of research on endangered, threatened and rare species from the outside and then from within. Externally, the amount of literature concerning threatened species is slight compared to the bulk of natural history writings. For example, the references on the twenty species of threatened birds is a subset of the material on Michigan birds, which in turn is a sliver of the material on birds, which is a subset of biology and again a subset of the field of natural history (please see diagram A). This means that we will need to be selective and narrow our search to be most effective.

There are a few conjectures as to why threatened species are

so poorly represented in the literature. Threatened species are generally less conspicuous and more easily overlooked, and these species are usually not of economic consequence and have not generated studies for resource management. Also, threatened species that have been early recognized as such are sometimes jealously protected by naturalists, so that they are deliberately not included in herbaria, and not publicized in order to cut down on well-meaning, but destructive gawkers and collectors.

A look at the internal organization of observations of the distribution of species affords us a different view. Naturalists and scientists keep logs of their observations, and even if nothing else is done with these logs, they at least have a chance of being published posthumously, or held in archives. More commonly, these observations are printed in books and journals and are made available to us through indexes. Early land surveys and later geological surveys were commissioned to catalogue the flora and fauna as well as the topography of a region. These were published by the land company or government.

This written mass of information constitutes the <u>retrospective</u> material of specie distribution and is accessed through guides (covering a subject or archive collection), indexes (to journal articles, general bibliographies (usually found at the end of articles), and project abstracts (required of and indexed by the government and foundations that provide grants for research). These tools create a network that expands to capture other related materials.

In addition to retrospective reports, there is a huge area of specie observation that remains untouched by indexes and guides. These are the unpublished, current logs of contemporary naturalists. These experts maintain their own communications, called an "invisible college" in information jargon, through conversations, meetings, correspondence, and limited-circulation newsletters. Naturalists tend to keep up with their trade, swap notes on unusual species in their territory and are knowledgeable of others' expertise. Also falling into this catagory of unpublished current records are the logs of university-sponsored field classes, biological stations, conservation clubs, and the internal records maintained by research centers. The access to these logs and experts is through directories of naturalists, associations, agencies, research centers and colleges. (Please see Figure B.)

In order to facilitate the approach to retrospective and current records of specie distribution, I have divided this paper into three sections. The first section includes this introduction and an historical overview of the development of natural history record-making in Michigan. It is hoped that this orientation to the larger picture will make the research to records of specie distribution easier and more enjoyable.

Section two presents sources useful for researching threatened species in each of the eight phylum listed by the Department of Natural Resources. A general reference chapter discuses the components of the later, more specific chapters.

Figure A: ILLUSTRATING THE NARROWNESS OF THE SEARCH FOR MATERIAL ON ENDANGERED, THREATENED AND RARE SPECIES IN MICHIGAN

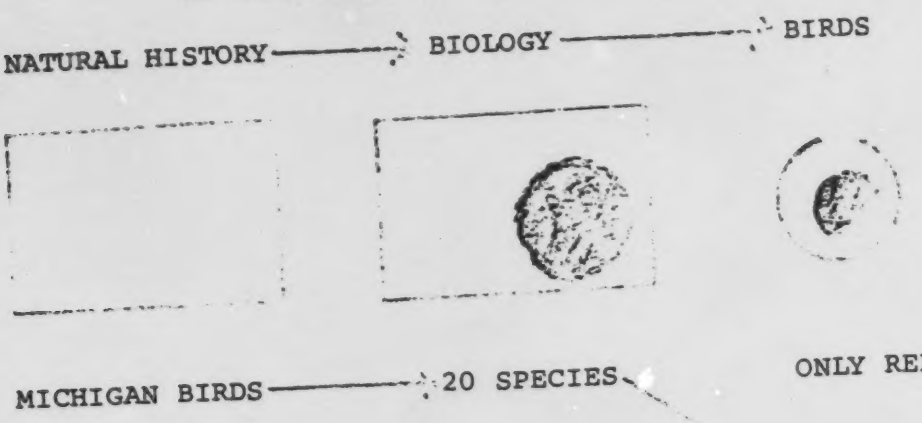
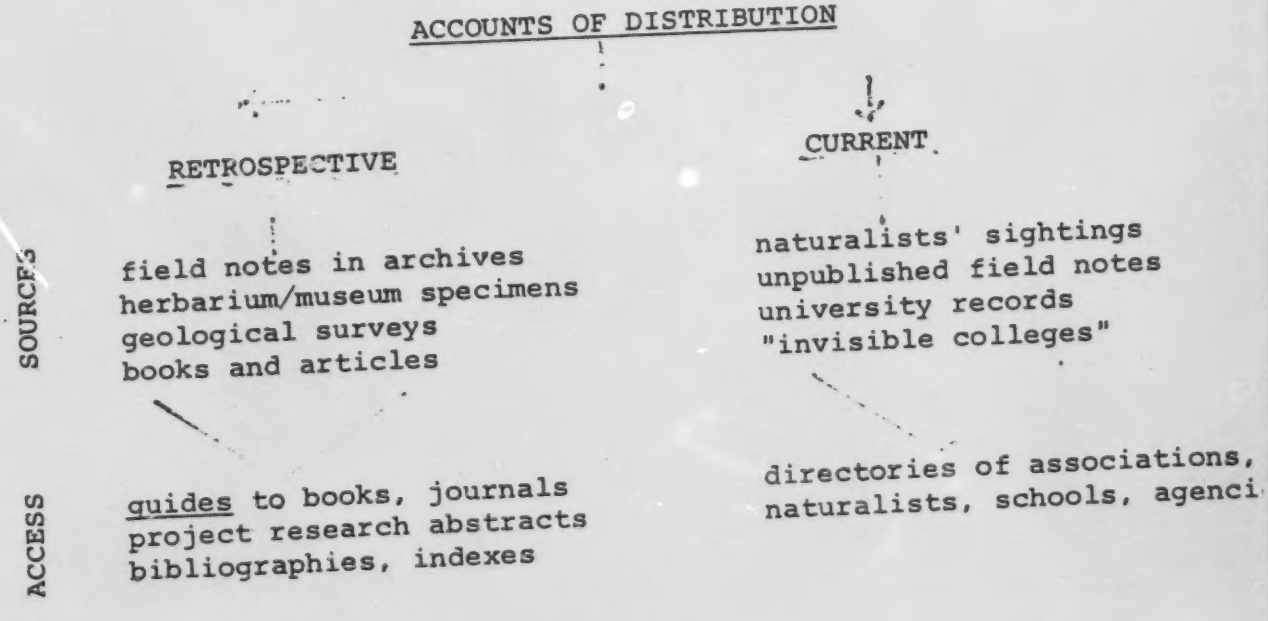


Figure B: TWO METHODS OF LOCATING MATERIAL ON THREATENED SPECIE DISTRIBUTION



The third section may be viewed as a series of directories that are useful for collecting current information It may prove more useful than that, particularly in regard to the chapter on agencie and associations. Several of these groups, as the Great Lakes Commission, are active in local research and provide bibliographies and journals as aids to searching retrospective materials.

I have tried to make this listing of sources as useful and clear as possible, with the result that most books and journals are listed at least twice --once in context, and again in the bibliography at the end of the paper.

CHAPTER TWO

In the sixteenth century, Michigan was peopled with Algonquins, broken into tribes of the Chippewa (or Ojibway) in the Upper Peninsula and eastern half of the lower, Ottawa in the western part of the Lower Peninsula, the Potawatomi, located around Lansing, and the Wyandott. In time, the Iroquois migrated into Michigan as their lands were taken in the East.

Little work has been done on the names of rare plants and animals ackowledged or used by the Indians. Apparently, the most work in recreating Algonquin Indian life has been done at the University of Wisconsin, and possibly reports on threatened species may be located through that school. Early explorer reports are generally too narrow and slanted to be of much use.

Early recorded exploration of Michigan began soon after the French founding of Quebec by Champlain in 1608. From this base of operation, French fur-trappers and Jesuit missionaries spread along the waterways, establishing settlements and trading posts. In 1622, Etienne Brule canoed down the St. Lawrence River, across the Georgian Bay, into Lake Superior and along the Upper Peninsula. Frs. Isaac Jogues and Charles Raymbault followed this lead, founded missions around Sault Ste. Marie and maintained a lively correspondence with government officials in France concerning the anthropology of the Michigan Indians. Unfortunately, except for mention of outstanding topographic features of the Upper Peninsula, these letters contain

little else of natural history significance.

Trading and exploration apparently remained in the northern waters for a long time due to the concentration of fur-bearing animals, the difficulty of canoeing in Lake Huron, and the inhospitable reputation of the Lower Peninsula Indians.

Following a peace treaty made with the Iroquois in 1667, Fr. Marquette began exploring Michigan, founding missions at Sault Ste. Marie and St. Ignace and traveling into Lake Michigan to discover the headwaters of the Mississippi River. During the same period, a small expedition followed the St Lawrence into Lake Erie, and along the Detroit River into Lake Huron. At this point, the general boundaries of Michigan were understood, and the founding of settlements began to accelerate. Hennepin's British expedition passed through the state during this period, as well.

Abruptly in 1691, King Louis XIV ordered the evacuation of the French western posts, and only the most talented lobbyists were allowed to remain. Cadillac was forced to leave a post near St. Ignace, but managed to petition for the establishment of Detroit in 1701. Increasingly, France withdrew its support of Michigan settlements, in order to better protect her interests in Europe and northeastern Canada. In the Treaty of Paris in 1763, all the French territory east of the Mississippi River was turned over to Great Britain, in whose possession it remained until twenty years after the Declaration of Independence (1796) when the British were forced from the Northwest Territory.

As a young American Territory of four-thousand population in 1810, Michigan attracted few settlers largely because little about it was known, and much of the area belonged to the Indians. During this year, the English-born naturalist, Thomas Nuttall, toured Michigan and kept a log of his observations which was only recently rediscovered. In 1815, the first official state survey was conducted by Edward Tiffin, surveyor general of the United States, and was so disasterous that Tiffin asked to be transferred from the assignment since he felt that the land was not worth the cost of the survey. Lewis Cass, governor of Michigan at the time, protested the opinion and persuaded the survey to contine and revise its initial impression, but the legend of swamps and sand persisted for decades. Partially in reaction to the first survey, and as part of a plan to negotiate for lands from the Indians, Governor Cass organized an expedition in 1820 and again in 1830 to explore the territory given to his care. Much has been written on these expeditions, especially by and about Henry Schoolcraft, geologist, and Douglass Houghton, naturalist. Following these publications, the population of Michigan steadily increased until, in 1837, it was admitted as a state into the Union.

A contemporary observation of the attitude to nature in America during this time is offered by Alexis de Tocqueville in the much-quoted, Democracy in America (1832):

> In Europe, people talk a great deal of the wilds of Americ. but the Americans themselves never think about them; they are insensible to the wonders of inanimate nature and they may be said not to perceive the mighty forests that surround them till they fall beneath the hatchet. Their eyes are fixed upon another sight: the American people views its own march across these wilds, draining swamps, turning the course of rivers, peopling solitudes, and subduing nature.

I use de Toqueville's commentary as a pivotal point in this overview of Michigan history because it underscores the notion that prior to the mid-nineteenth century, there are few natural history records besides the grand expeditions and geological surveys. Following the mid-1850's, there is an upsurgence of scholarly and popular interest and publication on Michigan natural history topics. The state universities (U-M was founded 1841; MSU was founded 1857) began to research and collect data. Louis Agaissiz toured Lake Superior with his gentlemen scholars and published memoires of their observations. And, changes in national attitudes were being affected by the writings of Henry David Thoreau (1817-1862) and the poem "Hiawatha", set in northern Michigan, by Henry Wordsworth Longfellow (1807-1882).

The controversy of whether the English Romantics (eg. Shelley 1792-1822) influenced the Americans, or if the French and American revolutions inspired the English Romantics is a moot question for this paper. It can be noticed however, that an interest in nature, expanding upon the natural history work of Carl Linneaus (1707-1778), was flourishing in Europe and America during the nineteenth century.

This interest created a "golden age" of naturalists, roughly coinciding with the career lifespans of early american conservationists, including John Muir (1838-1914) founder of the Sierra Club. Discussion of this trend is offered by Loren Owings in Environmental Values, 1860-1972:

> American nature study as a national movement began in the 1890's, after having "spontaneously" developed in the elementary schools in the latter part of the 1880's. Its most immediate aim was to acquaint young Americans with nature and may well be considered as concomitant to America's re-discovery of nature. During its heyday, roughly 1890-1925, ...enormous quantities of books, articles, and curricular materials were published...but, since about 1925, nature study has been eclipsed by the teaching of "elementary science" in the schools.

Evidence of this popular interest is found in the proliferation of state natural science societies and publications in the late nineteenth-early twentieth centuries. The Michigan Academy of Science was founded in 1894. Many local flora and fauna books first appeared at the turn of the century, such as Beal's "Flora of Michigan" (1904) and Barrows' Michigan Bird Life (1912). A few representative periodicals include:

Collectors' Science Monthly: a magazine devoted to the interests of collectors of natural history specimens, stamps, coins, etc. v.1-3, 1886. Battle Creek, MI.

Naturalist: devoted to the interests of the amateur science club. v.1-2, 1879-1880. Hudson, MI.

Naturalist Teacher: for teachers and school officers. v.1-?, 1892-1893. Ypsilanti, MI.

Wolverine Naturalist: a monthly magazine devoted to the study of ornithology, oology, entomology, herpetology, conchology, ethnology, geology, palaeontology and allied sciences. v.1, 1890. Kalamazoo, MI.

In 1905, a state biological survey act was passed "...to make under the general direction of the State Geologists,...a thorough biological survey of the State, embracing a determination of the range and distribution of the various plants and animals inhabiting the State...", thus affording for a regular review of specie distribution.

Following the first World War, a second flourishing of natural history interest occured, highlighted by the formation of the Michigan Department of Conservation in 1921, and the founding of the Cranbrook Institute of Science, in 1930.

Information on early Michigan exploration may be located in:

1698

Hennepin, Louis. A New Discovery of a Vast Country in America Extending Above Four Thousand Miles, Between New France and New Mexico: with a description of the Great Lakes, cataracts, rivers, plants,and animals. Also the manners, customs, and languages of the several native Indians and the advantage of commerce with those different nations. London: Printed for M. Bentley, J. Tonson, H. Bonwick, T. Bookwin and S. Manship, 1698.

1769 -1865

Meisel, Max. Bibliography of American Natural History, the Pioneer Century, 1769-1865: the role played by the scientific societies; scientific journals; natural history museums and botanic gardens; state geological and natural history surveys; federal exploring expeditions in the rise and progress of American botany, geology, mineralogy, Paleontology and zoology. 3v. Brooklyn, NY: Premier Publications, 1924-29.

Beautiful set. Four pages of references to works on the Cass expedition.

1810

Graustein, Jeannette E. "Nuttall's Travels into the Old Northwest: An Unpublished 1810 Diary." Chron.Bot. v.14(1951):1-88.

A recently discovered and published work. Nuttall first described many of the local species. Discussion of this exploration offered by Voss in his Michigan Flora.

1823 - 1955

Martin, Helen Mandeville. An Index of the Geology of Michigan, 1823-1955. Lansing: Speaker-Hines & Thomas, State Printers 1956. Z6034.U5M63

Excellent coverage of government-sponsored biological surveys.

1850

Agassiz, Louis. Lake Superior: its physical character, vegetation, and animals, compared with those of similar regions. With a narrative of the tour, by J. Elliot Cabot and contributions by other scientific gentlemen. Boston: Gould, Kendall and Lincoln, 1850. F552.A26

An interesting survey, possibly more illustrative of the sunset lyricism of nineteenth century naturalists than of reports of rare species. Usefulness is further complicated by the lack of an index and older genera-species terms.

Other early works and papers of naturalists may be located in the following special collections of Michigan history:

Archives, The Department of State, Lansing, Michigan: Records of the Michigan Conservation Department.

The Burton Historical Collection, The Detroit Public Library, Detroit.

William L. Clements Library, Ann Arbor.

Michigan Historical Collections, The University of Michigan, Ann Arbor.

Michigan Unit, The Michigan State Library, Lansing.

Many of these archives have guides to the collection, similar to the following example, which provide leads into the material:

Uhlendorf, Dr. Bernhard A. Guide to Manuscript Collections in Michigan. Michigan Historical Collections of the University of Michigan. Ann Arbor, 1941.

This guide discloses the presence of 100 documents belonging to Douglass Houghton.

Sources used in reconstructing this history of Michigan were:

Bald, F. Clever. Michigan in Four Centuries. New York: Harper and Brothers, 1954.

The Michigan Manual. 1975.

Owings, Loren C. Environmental Values, 1860-1971: a guide to information sources. (Man and the environment information series, v.4) Detroit: Gale Research, 1976.

SECTION TWO

CHAPTER THREE

The following chapters will provide suggestions for the most profitable sources of information on each phylum contained on the Department of Natural Resources' preliminary draft of endangered, threatened and rare species. For consistency, each chapter will follow the same format of presenting materials related to the subject. This formula is:

Handbooks, guides, texts

Outstanding books and articles

Indexes

Journals

Associations and agencies

Library of Congress Classification of materials

Systematic presentation of species within each phylum

Within each chapter, only the most specialized sources will be mentioned. This initial chapter will serve to introduce the more general sources and provide the rationale for the strategies of use.

Handbooks, guides and texts provide a wealth of material on a single subject within a compact, portable package. At the very least, these sources will help to orient the researcher to the structure and concerns of a discipline, by defining the characteristic anatomy and habitat of each species, and providing

charts and maps of specie distribution. "Guides" are really "guides to the literature of...(some topic)" and usually gloss over the scientific nuances of a discipline and delve into the writings tracing historical developments, highlighting outstanding researchers, and breaking down information into geographical areas. For our purposes, "North America," "Michigan" and "Great Lakes" are good, odvious search terms to use. Be alert however, for variations used by a compiler, as "North Central States" or "Northwest Territory" as well as the more specific catagories of "Lake Michigan" and "Washtenaw County."

Working with a handbook or text will be of continual assistance along the research trail. Many American plants and animals have undergone name-changes during the last two centuries as the genus-species names have become standardized and woven into evolutionary family relationships. A good handbook will include this kind of information and aid you in reading through nineteenth century reports. In addition, a general grounding in a type of organism is helpful. It is significant that the mussels and many of the snails are aquatic, and would fall into the scope of the many Great Lakes research facilities.

Guides that encompass the biological sciences are:

Environmental Information Sources Handbook. Garwood R. Wolff, ed. (Garwood R. Wolff & Co. Publication) New York: Simon and Schuster, 1974.

A very comprehensive, but incomplete work. Each entry and citation should include more information.

Sheehy, Eugene P. Guide to Reference Books. 9th ed. Chicago: American Library Association, 1976.

Section on "Biological Sciences."

Walford, Albert John. Guide to Reference Material. 3rd ed. London: Library Association, 1973. v.1 Science and Technology.

Walford is the British counterpart to Sheehy. Despite its larger size, the international emphasis in Walford tends to dilute its usefulness on this project.

Wynkoop, Sally. Subject Guide to Government Reference Books. Littleton, CO: Libraries Unlimited, 1972.

Of particular interest are the sources listed under "Biological Sciences" and "Wildlife Management."

Books and articles serve as the basic link to reports of specie distribution. Not only do these reports incorporate the observations of the researchers, but they tend to couch the observations in relation to older reports and surveys. These references are not supplied simply as a convenience for later researchers, but as part of the scientific ethic of research which supports the responsibility of scientists to offer their findings cooperatively to the rest of the scientific community, so that later scientists can hope to expand the base of knowledge.

For our purposes, it is significant to know that surveys and published sightings of organisms are generally rich in citations to other surveys. From one good survey, it is possible to go backwards

and forewards in time to gather other sightings. To travel backwards, take the citations from one article, locate the other documents, and use the bibliography of the second paper to spread the research net further. To travel forewards in time from an original paper, build upon the information gained from the retrospective search. Become aware of the names of researchers prominant in the field, the journals in which such surveys and discussions have been published, and the universities and research stations where surveys are sponsored. Then scan over the field, checking the indexes or table of contents in the appropriate journals, looking for titles or authors that are involved with the subject. Where one survey article is published, another is likely to appear, because there are always additions to the original report. Likewise, one can trace down the reports collected from a particular institution via their journals, proceedings and archival materials.

A few of the books that provide general survey material on many species in Michigan, or that contain bibliographies to surveys, or that are specialized books on endangered species, are listed below:

Adams, Chas. C. An Ecological Survey of Isle Royale, Lake Superior: a report from the University of Michigan museum, published by the State Biological Survey, as part of the Board of the Geological Survey for 1908. Lansing, MI: Wynkoop Hallenbeck Crawford Co., 1909.

Colby, Lila. Grand Traverse Bay in the Great Lakes Basin: a history of a changing area. Sea Grant Program of the University of Michigan and NOAA (National Oceanic and Atmospheric Administration: U.S. Department of Commerce. Ann Arbor: U-M Press, 1971. F572.G5C6

One third of the volume is a bibliography to sources on Michigan history of this region. Offers good suggestions for locating archival material. Includes chart of Christmas Waterfowl count, 1957-1969.

International Union for the Conservation of Nature and Natural Resources. Survival Service Commission. Red Data Book. Morges, Switzerland, 1966-1972. v. 1-5.

A looseleaf series covering mammals, birds, fish, plants and invertebrates. Emphasis is on international species. Different volumes have been reformatted into popular books on the subjects.

U.S. Fish and Wildlife Service. Rare and Endangered Fish and Wildlife of the U.S. rev.ed. Washington: GPO, 1969.

This volume has been superseded by the STINFO computer data base on endangered species . (See U.S. Army Corps of Engineers in the agency section for more detailes on the data base.)

The best general indexes to the literature covering the journals and articles we are interested in would be:

Biological Abstracts: from the world biological research literature. v.1- , 1926- . Philadelphia, PA: Biological Abstracts, 1926- .

Journals that are included in this service are: AUK; Bird-Banding: Botanical Gazette: Great Lakes Entomologist; Jack-Pine Warbler; Journal of Herpetology; Limnos; Ontario Fish and Wildlife Review. Cummulates semiannually.

Bioresearch Index. Monthly. Philadelphia:BA.

Provides citations to articles and reports not already listed in Biological Abstracts. Annual cummulation.

Because the number of search terms is so large (401 species) in this project, and the Biological Abstracts specie list (called the Biosystematic Index) does not really get specific enough to allow for easy use, I suggest using the subject KWIC index under the headings of "Michigan" and "Great Lakes" for locating articles, and then consulting the abstract for likely-looking entries, as a short-cut technique.

Supplying much the same function as Bioresearch Index, the following indexes provide abstracts of on-going research activities. In order to receive and maintain grants from the government or foundations, research teams must submit proposals and progress reports on a regular basis. These are abstracted and published, with the entire report available upon request. Some of the most useful recent survey material is available through these index channels.

Government Reports Announcements. v.1- , 1946- . Washington: GPO. Semimonthly.

Provides abstracts for R&D reports of agencies funded by government. Arranged by broad subject.

Government Reports Index. v.1- , 1965- . Washington: GPO. Semimonthly with annual cummulation.

A subject/author/institution/etc. listing to GRA. Very useful. Good material listed under "Michigan," "Insects," "Invertebrates," "Wildlife," "Fishes," etc.

This publication is sponsored by NTIS (National Technical Information Service) which also provides computer searches of the index at $50 for 25-100 abstracts.

Great Lakes Research Advisory Board of the International Joint Commission. Directory of Great Lakes Research

Activities. 1975- . Annual. TD22.3.D5

1976 volume is much improved with a subject index as well as the broadly classified arrangement of reports. Much information in present on aquatic surveying, best topic is "Biology."

Other useful general indexes are:

Aquatic Sciences and Fisheries Abstracts. v.1- , 1971- . London: Information Retrieval Ltd., 1971- . Monthly.

Indexes under land and water areas/ taxonomic names, author/subject. Has annual cummulation.

U.S. Fish and Wildlife Service. Wildlife Abstracts: a bibliography and index of the abstracts in Wildlife Review. n.1/66- , 1936/51- . Quarterly.

Wildlife Review. No. 67- , 1952- . Quarterly.

Indexes to the subject matter of the geological surveys:

Martin, Helen Mandeville. An Index of the Geology of Michigan, 1823-1955. Lansing: Speaker-Hines & Thomas, State Printers, 1956. Z6034.U5M63

Excellent source through 1955. Subject index is helpful under "Biological Survey" and "Biology of Michigan." Whole section on early surveys that were not officially labeled "biological" although were so in fact.

U.S. Geological Survey. Publications of the Geological Survey, 1879-1961. Washington; GPO, 1964. Z6034.U49U53

Has annual 1962- supplement. Arranged by series name, with subject, geographic and author indexes.

For Michigan Department of Natural Resources information, use:

Michigan Documents. Michigan Department of Education. State Library Services. N.1- , 1952- . Z1223.5.M5A2

An index of official state publications arranged by department. Not very lucrative, but best subject heading is the "Natural Resources Dept." Remember that before 1968, the department was called Department of Conservation. Until 1976, the catalog had a multiple subject index which was quicker to use for specific information.

Prior to 1952, use the Monthly Catalog.

Monthly Catalog of United States Government Publications. Washington: GPO, 1895- .

Title and format vary on this series. Arranged by department and bureau, with an annual index. There are two decennial cummulative indexes covering 1941-1960 for subject access to government publications.

Periodicals are vital components of scientific research.

Three guides to periodicals are of especial note:

Environmental Periodicals Bibliography: Indexed article titles. A current awareness bibliography featuring serial publications in the area of environmental studies. v.1- , 1972- . Santa Barbara, CA: Environmental Studies Inst. Bimonthly. Formerly: Environmental Periodicals: Indexed article titles.

Reproduces the table of contents from environmental journals. Good for recent work.

Underwood, Margaret H., ed. Bibliography of North American Minor Natural History Serials in the University of Michigan Libraries. Ann Arbor: U-M Press, 1954.

Has an index by state, of natural history magazin of limited circulation. Main listing is alphabetical by publication with annotations. Excellent for local history, and useful for locating materials in Canada and surrounding midwest states as well.

Union List of Science and Technology Serials in the University of Michigan Library. 10th ed. 2v. University Library. Ann Arbor, 1975.

Huge selection of publications particularly under "Michigan..." and "Great Lakes." I have only selected a few of them for this paper, and many more may be of use.

The outstanding periodicals for researching the distribution of Michigan flora and fauna would be:

Communicator Newsletter. Great Lakes Basin Commission. v.1- , 196?-. Monthly

Cranbrook Institute of Science. Report. v.1- , 1930/31- .

Great Lakes Commission. Checklist: a bibliography of Great Lakes Research. Semimonthly.

LIMNOS. v.1- , 1968- . Ann Arbor: Great Lakes Foundation. Quarterly.

Indexed in Biological Abstracts.

Michigan Academician. v.1- , 1969- . Ann Arbor, MI. Michigan Academy of Science, Arts and Letters. Supersedes Michigan Academy of Science, Arts and Letters. Papers. 1921-1967, and Michigan Academy of Science. Annual Report. 1900-1920.

Michigan Natural Resources Council. Reports of Technical Committees. n.1- , 1961- .

Michigan State University. East Lansing. Kellogg Biolobical Station. Collected Reprints. v.1- , 1967- .

_____. Museum. Publications. Biological Series. N.1- , 1967- .

Michigan. University. Great Lakes Research Division. Collected Reprints. v.1- , 1967- .

_____. Contributions from the Laboratory of Vertebrate Biology. v.1,76, ca. 1930-1962.

_____. Miscellaneous Publications of the Museum of Zoology. 1913- .

_____. Occasional Papers of the Museum of Zoology. 1913-

Michigan. Western Michigan University, Kalamazoo. Adams Center for Ecological Studies. Occasional Papers. n.1-18, 1960-1969.

Ontario Fish and Wildlife Review. v.1- , 1961- . Toronto: Ontario Ministry of Natural Resources. Quarterly.

Indexed in Biological Abstracts.

Ontario Naturalist. v.1- , 1963- Don Mills, Ontario: Federation of Ontario Naturalists. 5/year.

Please also see the lists of periodicals at the end of this paper.

Associations and agencies with an interest in natural history have a vested interest in endangered species and often sponsor research and preservation projects. In the third section of this paper, an annotated list of local agencies and associations appears. In addition, specific groups are indicated within each phylum when appropriate.

Besides the strategy of locating relevent articles through guides and bibliographies, it is also possible to scan the field of published books and journals through the library card catalog. Locating materials in the subject card-catalog is a familiar strategy, and for this project, special attention should be given to subheadings following a broad term, such as "Fishes -- Congress and Proceedings" and "Birds -- Michigan."

If the library is large, or has a special collection in the area of research --such as a research library for a department of fisheries-- then materials are also placed under the subject headings of the exact specie name, such as Acipenser fulvens (Lake sturgeon). In addition, browsing on the shelves of a library, or checking into the shelf-list, may uncover books of value to Michigan natural history. In general, more recent research tends to be reported in journals or drafted in research project reports. But older works, dating into the golden days of natural history, and new texts and state surveys are found through the catalog.

The shelf-list is a miniature replica of the shelves, with each book described on a catalog card, and filed in Library of Congress classification order. The "Q's" are good for biology in general, and the "Z"-classed items are reserved for bibliographies.

In addition to using the card catalogs of local libraries, there are bound volumes of special library collections available as well. As mentioned above, one of the advantages to special

library collections is that the materials are often more finely inde and can be found under more catagories, and are also often listed under the Latin species name. More likely than not, a useful book located in a special collection catalog can also be found in local libraries under the title or author. A few special collection catalogs appropriate for natural history research would be:

Blacker-Wood Library of Zoology and Ornithology. A Dictionary Catalogue of the Blacker-Wood Library... Boston: G.K. Hall, 1966. 9v.

U.S. Department of the Interior Library. Dictionary Catalog of the Department Library. 37 vols. plus supplements. G.K. Hall, 1966-70.

For convenience in researching the species in question, I have created expanded lists of the scientific systematic classificatic to illustrate the relationship of a species to its family, order and phylum. Since some indexes, as the "Biosystematic Index" in Biological Abstracts list species under their respective phylum and family, such an aid may prove helpful. Be again cautioned that a species' Latin name may have changed in the past, and that its family relationship may have been different in older works. The charts presented are constructed to current rules of systematics. To further aid the researcher, I have listed the families in alphabetic order rather than according to evolutionary relationships.

CHAPTER FOUR
Mollusks: Mussels and Snails

The literature concerning mollusk distribution in Michigan appears to be defused throughout the zoological journals of the scientific community. Many records are held at biological field stations and aquatic research stations in the state. Please see attached lists in the last section of this paper for references to these centers.

A key article on the subject, and a few supportive reports are:

Van Der Schalie, Henry. "An Ecological Approach to Rare and Endangered Species in the Great Lakes Resgion." The Michigan Academician. (Summer 1975).

Bovbjerg, Richard V. "The Mussel Fauna of a Michigan Stream, Twenty Years Later." The Michigan Academician. (Fall 1971):183-192.

Heard, William H. "The Sphaeriidae (Mollusca:Pelecypoda) of the North American Great Lakes. American Midland Naturalist. 67 (1962):194-198.

Hiltunen, Jarl K. "Invertebrate Macrobenthos of Western Lake Superior." The Michigan Academician. (Spring 1969): 123-134.

Materials on mollusks may be found on the shelves or in the shelf-list of a library at the Library of Congress Location of QL 401 to QL432. Scientific works on mussels (or bi-valves) may be located in the subject catalog under "Unionidae." Use "Gastropoda" for scientific books on snails (also known as uni-valves). Popular

works, such as guides to sea-shells and pseudo-scientific stories, are indexed under "Mussels--Freshwater" and "Snails." These latter catagories are generally not appropriate for collecting data on rare specie distribution. The term "Benthos," meaning "organisms that live on the bottom of bodies of water" and "limnology" refering to the "study of fresh-water, as opposed to salt-water" are helpful terms to flag related articles on Great Lakes biology.

A basic guide to the study of invertebrates, which will be available in completed form sometime in the future, is:

Hyman, Libbie Henrietta. The Invertebrates. New York: McGraw-Hill, 1940- . v.1-6. QH362.H9

Billed as the best treatise on the subject. Volume six on mullusks is still in progress. Earlier volumes offer extensive bibliographies for each family.

Phylum - Invertebrae

Class - Pelecypoda (Mussels, bivalves)

Order Family Generic - popular names

Filibranchia

Anisomyaria (suborder)

(?)

Actinonaias ellipsiformis (Lea) T

Anodonta subgibbosa (Anthony) T

Carunculina glans (Barnes) R

Cyclonaias tuberculata (Rafinesque) T

Dysnomia sulcata (Lea) = Dysnomia perplexa ranqiar

Dysnomia Triquetra (Rafinesque) T

Elliptio complanatus (Dillwyn) T

Lampsilis fasciola (Rafinesque) T

Obovaria leibii (Lea) = O.subrotunda (Rafinesque)

Pleurobema clava (Lamarck) T

Simpsoniconcha ambigua (Say) E

Villosa (Micromya) fabilis (Lea) R

Phylum - Invertebrae

Class - Gastropoda (Snails, univalves)

Order Family Generic - popular names

(?)

(?)

Amnicola binneyana (Hannibal) = Cincinnatia emarginata (Say) T

Anquispira Kochi (Pfeiffer) = A. solitaria (Say) T

Discus patulus (Deshayes) = Gonyodiscus perspectivus (Say) T

Haplotrema concavus (Say) = Circinnaria T

Helisoma multivolvis (Case) R

Lymnaea contracta (Currier) R

L. haldemani (Deshayes) R

L. megasoma (Say) T

Mesodon (Polygyra)elevata (Say) T

M. (Polygyra) sayana (Pilsbry) T

Mesomphix cupreus (Rafinesque) = Omphalina T

Paludestrina (Fontigens) nicklineana (Lea) T

Philomycus carolinianus (Bosc) R

Planogyra astericus (Morse) R

Pomatiopsis cincinnatiensis (Lea) T

Pyrgulopsis letsoni (Walker) R

Triodopsis notata (Deshayes) = Polygyra palliata (Say) T

Zoogenetes harpa (Say) T

CHAPTER FIVE
Insects

Studies and surveys concerning insects are often batched with other disciplines when published. An article on the life-cycle of a specific beetle will often be combined with the management of a forest, with the content of the former essay intended to inform a ranger of strategies to handle a "pest" or "pollinator " A significant exception to this overstatement lies in the professional societies of entomologists which take pains to record the presence of even the least of their legion charges.

A good background reference book to orient the researcher to the field of entomology is:

Borror, Donald J. and DeLong, Dwight M. An Introduction to the Study of Insects. 4th ed. New York: Hold, Rinehart and Winston, 1971. QL463.B69

> This text supplies descriptive and habitat information, but has little to offer as far as specifics concerning Michigan species distribution.

A book that afforded information on famous entomologists including biographical particulars of at least two noted Michigan collectors was:

Mallis, Arnold. American Entomologists. New Brunswick, NJ: Rutgers University Press, 1971.

> There is no index, but it is easy to browse through the chapters. Henry Guernsey Hubbard (1850-1899) and Albert John Cook (1842-1916) were cited as famous Michigan entomologists.

The major indexes in entomology are compiled in Europe and suffer from an agricultural/management slant. The minor entomological indexes are specialized so as to not be appropriate for our topic either. The best single index source to entomology is Biological Abstracts. The best source of information regarding the distribution of rare and threatened insects in Michigan would be the professional journals listed below.

American Entomological Society. Transactions. v.1- , 1867- Philadelphia, PA. Quarterly.

Indexed in Biological Abstracts.

Great Lakes Entomologist. v.1- , 1966- . East Lansing: Michigan Entomological Society. Quarterly.

Indexed in Biological Abstracts. Excellent.

Michigan Academy of Science, Arts and Letters. Papers. 1921-1967. Formerly: Michigan Academy of Science. Annual Report. 1900-1920.

Before the Michigan Entomological Society had their own journal, articles of regional interest were often funneled into these publications.

The best search terms to use in the subject card catalog or subject bibliographies are "Insects" and "Insects--Michigan." For our purposes, another likely term would be "Michigan Entomological Society -- Congress and Proceedings" in the author-title catalog to locate the reports delivered at meetings. For browsing on the shelves, the Library of Congress classification for insects spans QL469 to QL491. Bibliographies are located around Z 5856.

Phylum - Invertebrae

Class - Insecta

Order	Family	Genus - popular name
Coleoptera		
	(?)	Liodessus cantralli (Young) R
Orthoptera		
Ensifera (suborder)		
	Gryllidae (Crickets)	
	Oecanthinae (subfamily)(tree crickets)	
		Oecanthus laricis (T.J. Walker) R
		O. pini (Beutenmuller) R
	Decticinae (subfamily) (shield-backed grasshoppers)	
		Atlanticus davisi (Rehn and Hebard) R
(?)		
	(?)	
		Appalacia arcana (Hubbell and Cantrall) R

CHAPTER SIX
Fishes

The bibliographic work done on fishes in the Great Lakes region forms a well-defined package of research. The work takes the form of "handbooks" which attempt to describe, define, and list references to all fishes found within the geographic juristiction of the report. The best examples of this genre of references are:

Carlander, Kenneth D. Handbook of Freshwater Fishery Biology. v.1. Ames, IA: Iowa State University Press, 1969. QL652.C373

Best section for our purposes is "Life Histories by Species."

Hubbs, Carl L. and Lagler, Karl D. Fishes of the Great Lakes Region: with a new preface. 2nd ed. Ann Arbor: Univ. of Michigan Press, 1947, 1967.

The most specific basic source. Indexes both by scientific and common names. Earlier edition published by Cranbrook, Bulletin no. 26, may offer more older citations as well.

Scott, W.B., and Crossman, E.J. Freshwater Fishes of Canada. Bulletin 184. Ottawa: Fisheries Research Board of Canada, 1973. QL626.S34

Much attention is given to Great Lakes fishes. Eighty pages are devoted to the Cisco alone, with many citations included. There is also a 50-page bibliography to more general works. Scott' 1954 edition issued by the University of Toronto is useful for older references, although the covera is much less complete.

Other handbooks worth mentioning suffer only from being prepared with older taxonomic names for the species. For example, in Storer, I was able to locate 13 references following the report on "Lake sturgeon", but it was listed under Acipenser rubicondus

(Lesueur) rather than the current name of Acipenser fulvescens (Rafinesque). For this reason, it is helpful to search under the common name in the indexes of older works, and browse a bit before rejecting a source.

Jordan, David Starr. A Classification of Fishes: including families and genera as far as known. Stanford University Publication, University Series, Biological Sciences, v.3, no.2 Palo Alto, CA: Stanford University, 1923. QL618.J72

Storer, David Humphrey. A Synopsis of the Fishes of North America. (Memoirs of the American Academy of Arts and Sciences, New Series, v.2. Cambridge, 1946; reprint ed. Amsterdam, The Netherlands: A. Asher & Co., 1972) QL652.S77

Special indexes and bibliographies to fishes and fish research are listed below:

Checklist: a bibliography of Great Lakes Research. Great Lakes Commission. Semimonthly.

Dean, Bashford. A Bibliography of Fishes. 3 vols. enl. and ed. by C.R. Eastman New York: American Museum of Natural History, 1916-1923. Z5971.D35

This basic index to articles and monographs on fishes is updated by the Dean Bibliography of Fishes, 1968- , a computer-produced index to international reports and journal articles. Quickest access to relevent articles seems to be to use the geographic index, looking under "North America" and then "Michigan" "Lake Superior" "Lake Erie" etc., to locate material

U.S. Bureau of Commercial Fisheries. Fishery Publications Index, 1955-64: publications of the Fish and Wildlife Service by series, authors and subjects. Comp. by George Washington University. Washington:GPO, 1969.

Emphasis is on commercial fishing and management, but other articles will surface here as well.

An Indexed Bibliography of Fish Research Publications for the Year of 1975. comp. Victor A. Cvuancara for the American Fisheries Society, Wisconsin Chapter. Chippewa Falls, WI, 1977.

900 entries from 155 journals with cross-indexing to species and keywords.

The next article includes a large bibliography:

Great Lakes Fish Egg and Larvae Identification. U.S. Fish and Wildlife Service, Ann Arbor, MI. Pamphlet. Free.

Also indexes 377 publications on the subject.

The following periodicals are of particular interest to research on Michigan species of fish.

Communicator (newsletter). Ann Arbor: Great Lakes Basin Commission. Monthly.

Great Lakes News Letter. v.1- , 1956- . Ann Arbor: Great Lakes Commission. Bimonthly.

Great Lakes Research Highlights. v.1- , 1973- . Grosse Ile: U.S. Environmental Protection Agency. Semiannual.

LIMNOS. v.1- , 1968- . Ann Arbor: Great Lakes Foundation. Quarterly.

Indexed in Biological Abstracts.

Michigan Academician. v.1- , 1969 -. Ann Arbor: Michigan Academy of Science, arts and Letters. Supersedes the Academys publications since 1900- .

Ontario Fish and Wildlife Review. v.1- , 1961- . Toronto: Ontario Ministry of Natural Resources. Quarterly.

Indexed in Biological Abstracts.

In addition to the general sources of information on associations and agencies involved with natural resources, these

directories are of particular interest:

Great Lakes Research Advisory Board of the International Joint Commission. Directory of Great Lakes Research Activities. Feb. 1975- . Annual TD223.3.D5

Although this compilation encompasses many projects ranging from anthropology to zoology, is is exceptionally good in fish research. Use index under "Biology--Fish--Habitats " for best results. Directory reproduces research intent, names of participants and cooperating agencies. Full reports may be obtained from the researchers.

U.S. Department of Commerce. National Oceanic and Atmospheric Administration. National Marine Fisheries Service. List of Fishery Associations in the United States, 1969-1970. Fishery Leaflet 634. Seattle, WA. February, 1971.

Below are listed associations and agencies of interest to research in Michigan fishes. Please see directory at end of paper fc full addresses.

Big Bay De Noc Fisherman's Association

Fisheries Council of the Great Lakes

Great Lakes Basin Commission

Great Lakes Commission

Great Lakes Fishery Commission

Great Lakes Fishery Laboratory

Great Lakes Foundation

Great Lakes Institute (Canadian)

Great Lakes Laboratory

Great Lakes Research Division

Lake St. Clair Advisory Committee

Lake Superior Commercial Fishermen's Association

Menominee County Fishermens Association

Michigan Academy of Science, Arts and Letters

Michigan Department of Natural Resources

Michigan Fish Produces Association

Michigan Lake and Stream Associations

Michigan United Conservation Clubs

National Marine Fisheries Service

U.S. Environmental Protection Agency, Grosse Ile Laborator

To locate further materials in a library collection, look under "Fishes" which is further broken down alphabetically into the subject terms of "Fishes--Freshwater--Great Lakes (or Michigan)" and "Fishes--Great Lakes." On the shelves, and in the shelf-list of a library, the subject fishes is located from QL614 to QL639. Bibliographies of fishes are located between Z5971-5975.

Phylum - Chordata

Class - Pices

Order Family Generic - popular names

Acipenseriformes (or Chondrostei)

Acipenseridae

Acipenser fulvenscens (Rafinesque) Lake sturgeon T

Cypriniformes (or Ostariophysi)

Cyprinidae

Clinostomus elongatus (Kirtland) Redside dance T

Notropis photogenis (Cope) Silver shiner T

Perciformes

Percidae

Stizostedion vitreum glaucum (Hubbs) Blue pike E

Ammocrypta pellucida (Agassiz) Eastern sand-darter T

Salmonidae

Coregoninae (subfamily)

Coregonus alpenae (Koelz) Longjaw cisco E

C. artedii (Lesueur) Lake herring cisco T

C. hoyi (Gill) Bloater T

C. johannae (Wagner) Deep water cisco E

C. kiyi (Koelz) Kiyi

C. nigripinnis (Gill) Blackfin cisco E

C. reighardi (Koelz) Shortnose cisco E

C. zenithicus (Jordan & Everman) Shortjaw cisco E

Phylum - Chordata

Class - Pices

Order	Family	Generic - popular names
(?)		
	Catostomidae	
		Moxostoma carinatum (Cope) River redhorse T
(?)		
	Ictaluridae	
		Norturus stigmosus (Taylor) Northern Madtom T

SECTION SEVEN
Amphibians and Reptiles

Suggested handbooks on amphibians and reptiles that provide descriptions of species, brief distribution notes, and citations to actual sightings, are:

Conant, Roger. The Reptiles of Ohio. 2nd ed. Notre Dame, IN: University of Notre Dame Press, 1951.

Schmidt, Karl P. A Checklist of North American Amphibians and Reptiles. 6th ed. American Society of Icthyologists and Herpetologists. Chicago: University of Chicago Press, 1953. QL651.S36

Includes good references to local sightings.

Until recently, the only index access to amphibian and reptile articles was through references listed at the end of an appropriate article, or through Biological Abstracts. Recently, the Herpetological Information Search Systems (HISS) have developed several research aids in the field of herpetology (the science of amphibians and reptiles). As they confess in the prefaces of these works however, they cannot produce these volumes without an adequate subscription audience and, so far, the response to their publications has not been overwhelming. So, their books and journal may not provide a long-range solution to keeping up with herpetological research.

Dowling, Herndon G. 1974 Yearbook of Herpetology. v.1- . Herpetological Information Search Systems. New York: The American Museum of Natural History, 1975.

HISS Titles and Review. v.1- 1973- . New York: Herpetological Information Search Systems. 5/year.

All of the sources covered in the general and mammals chapter of this paper will be helpful for researching articles and reports on amphibians and reptiles. Please annex those chapters to this one

A basic article on Michigan herpetology is:

Thompson, Crystal. "The Reptiles and Amphibians of Manistee County, Michigan." Occasional Papers of the Museum of Zoology. University of Michigan. no. 18. December 15, 1915.

One special society that bears mentioning at this junction is the American Society of Icthyologists and Herpetologists.

Materials on herpetology may be located in the library card subject catalog under "Reptiles" and "Batrachia" (for amphibians). Additional material of a more popular nature may be found under the common names of reptiles and amphibians, such as "Snakes,""Turtles, "Frogs" and "Salamanders.: The scientific material is located on the shelves and in the shelf-list at QL641 to QL669 for both reptiles and amphibians. Bibliographies are filed within zoology around Z7995.

Phylum - Chordata

Class - Amphibia (or Amphiba)

Order	Family	Generic - popular names
Caudata		
	Ambystomidae	
		Ambystoma opacum (Gravenhorst) Marbled salamander T
		Ambystoma texanum (Matthes) Small-mouthed salamander T
	Plethodontinae	
		Hemidactylium scutatum Four-toed salamander R
	Scincidae (lizards)	
		Eumeces fasciatus Five-lined skink
	Sirenidae	
		Siren intermedia nettingi (Goin) Western lesser sire T

Phylum - Chordata

Class - Reptalia

Order Family Generic - popular names

(?)

Colubridae (snakes)

Elaphe obsoleta obsolata (Say) Black ratsnake T

Natrix (Clonophis) kirtlandi (Kennicot)
Kirtland's water snake T

N. erythrogaster neglecta (Conant) Northern
copperbelly T

Subclass - Anapsida (turtles)

Chelonia

Emydidae

Clemmys guttata spotted turtle R

C. insculpta Wood turtle R

Terrapene carolina carolina (Linnaeus)
Eastern box turtle T

Trionychidae

Trionyx spiniferus spiniferus Eastern
spiny softshell R

CHAPTER EIGHT
Birds

The definitive retrospective source for determining the distribution of birds in Michigan is:

Barrows, Walter Bradford. Michigan Bird Life. Lansing, MI Michigan Agricultural College, 1912.

Includes almost all relevent articles and observations up to its publication date. Within the specie description, Barrows inserts data on habitat and distribution. a 20-page bibliography indexes hundreds of articles, many of them reporting observations of rare birds.

Post-1912 observations of rare birds are scattered through publications of Michigan naturalists, or kept on file in local Audubon offices. The Jack-Pine Warbler regularly publishes Michigan bird counts. A recent special service offered by the Audubon Society is a 24-hour, dial-a-message Rare Bird Alert (313) 893-8020, which attempts to verify and maintain records of infrequently-seen species. A study on Northern Michigan bird distribution is:

Pettingill, O.S., Jr. Ornithology at the University of Michigan Biological Station and the Birds of the Region. Special Publication No. 1, Kalamazoo Nature Center, 1974.

Many journals devoted to ornithology circulated at the turn of the century, lasting for only a few years, or issues, each. Please locate these magazines in the periodical bibliography at the end of this paper. A selected list of more-enduring periodicals concerned with Michigan ornithology appear below.

American Birds: devoted to reporting the distribution, migration and abundance of North American birds. v.1- 1947- . New York: National Audubon Society. Bimonthly. Incorporating: Audubon Field Notes.

AUK: a journal of ornithology. v.1- , 1884- . Corvallis, OR: American Ornithologists' Union. Quarterly.

Indexed in Biological Abstracts.

Bird-Banding: a journal of ornithological investigation. v.1- , 1930- . Bedford, NH: Northeastern Bird-Banding Association. Quarterly.

Indexed in Biological Abstracts.

Jack-Pine Warbler. v.1- , 1922- . Kalamazoo: Michigan Audubon Society. Quarterly.

Indexed in Biological Abstracts.

Michigan Ornithological Club. Bulletin. v.1-6, 1897-1935.

Ontario Naturalist. v.1- , 1963- .

The recreational aspect of bird-watching gives rise to a large, active roster of associations, including virtually all of the naturalist groups of the area. For brevity, I will list only those associations that are primarily concerned with birds, and rely on the researcher to make use of the full list of Michigan associations and agencies listed in the last section of this paper.

Michigan Audubon Society

The main headquarters of the Audubon Society is in Kalamazoo, but there are literally dozens of local groups (ie., Bluewater Audubon, Birmingham Audubon, Detroit Audubon) of which only the national office is aware. Each of these groups sponsor special projects, field trips and publications to their members.

Migratory Bird Conservation Commission. U.S. Department of the Interior.

Further sources on birds may be located in the subject catalogs under simply "Birds" or "Birds--Michigan." On the shelves the Library of Congress numbers for birds are QL671 to QL699. In particular, books dealing with bird distribution are located from QL678 to QL695. Bibliographies are located from Z5331 to Z5335.

Phylum - Chordata

Class - Aves (Birds)

Order Family Generic - popular names

Charadriiformes

Charadriidae

Charadriinae (subfamily)

Charadrious melodus (Ord) Piping plover T

Ciconiiformes

Ardeidae

Botaurus lentiginosus (Rockett) American bittern R

Nycticorax nycticorax (Linneaus) Black-crowned night heron R

Falconiformes

Accipitridae

Accipiter cooperi Coopers hawk T

A. striatus (Vieillot) Sharp-shinned hawk R

Buteo lineatus (Gmelin) Red-shouldered hawk T

Circus cyaneus (Linnaeus) Marsh hawk T

Haleaeetus leucocephalus (Linnaeus) Bald eagle T

Falconidae

Falco columbarius (Linneaus) Pigeon hawk R

F. peregrinus Peregrine falcon E

Pandionidae

Pandion haliaetus (Linneaus) Osprey T

Phylum - Chordata

Class - Aves (Birds)

Order Family Generic - popular names

Galliformes

Tetraonidae

Tympnuchus cupido (Linneaus) Greater prairie chicken T

Gaviiformes

Gaviidae

Gavia immer (Brunnich) Common loon R

Gruiformes

Gruidae

Grus canadensis (Linneaus) Sandhill Crane R

Passeriformes (perching birds)

Laniidae

Lanius ludovicianus (Linneaus) Loggerhead shrike

Parulidae

Dendroica kirtlandia (Baird) Kirtland's warbler E

Pelecaniformes

Phalacrocoracidae

Phalacrocorax auritus (Lesson) Double-crested cormorant T

Strigiformes

Tytonidae

Strix varia (Barton) Barred owl R

Tyto alba (Scopoli) Barn owl T

CHAPTER NINE
Mammals

The predicament of the endangered species of mammals has historically received much attention. Both the government and national conservation groups have been responsible for initiating and sustaining interest in endangered species. In the wake of concer over certain threatened animals, these groups and agencies have become increasingly responsible for observing and protecting other endangered species, enlarging the compass of their work to include birds, reptiles, insects, mollusks, fishes and amphibians as well as mammals. The result of this trend is that many of the sources discussed in this section will also apply to other catagories of animals and sould be used in commection with the other phyla. A minor drawback to the evolution of wildlife conservation is that there is much popular material, of little use for our research, intermingled with the scientific reports.

A good, basic guide to mammals:

Burton, Maurice. Systematic Dictionary of Mammals of the World. New York: Thomas Y. Crowell Co., 1962. QL708.B85

Background books for endangered animals include:

Allen, Glover M. Extinct and Vanishing Mammals of the Western Hemisphere: with the marine species of all the oceans. Special Pub. no. 11. Washington, DC: Commit for International Wildlife Protection, 1942. (Reprinted by New York: Cooper Square Publishers, 1972) QL714.A44

Older work. Contains a 35-page bibliography.

Fisher, James, Simon, Noel, and Vincent, Jack. Wildlife in Danger. New York: Viking, 1969. QL708.F48

Not very good, but often quoted in other works.

Fitter, Richard. Vanishing Wild Animals of the World. New York: Franklin Watts, 1968. QL88.F5

Mostly a picture book, but mentions Kirtland's warbler and the prairie chicken.

International Union for the Conservation of Nature and Natural Resources. Survival Service Commission. Red Data Book. Morges, Switzerland, v.1-5, 1966-1972.

A looseleaf series to "draw universal attention to the dangers facing these species, and to provide fundamental background data..." viz. author's introducation.

U.S. Army Corps of Engineers. STINFO (Scientific and Technical Information Division). Endangered Species: a machine-readable data base.

Address/phone number given in agency section.

U.S. Fish and Wildlife Service. Rare and Endangered Fish and Wildlife of the U.S. Rev.ed. Washington: GPO, 1969.

Early reports on Michigan mammals include:

Hatt, Robert T., et al. Island Life: a study of the land vertebrates of the islands of eastern Lake Michigan. Cranbrook Institute of Science, Bulletin no. 27. Bloomfield Hills, 1948.

Wood, Norman A. "Annotated Checklist of Michigan Mammals." Occasional Papers of the Museum of Zoology. University of Michigan, no. 4. April 1, 1941.

Publications that are particularly appropriate for researching Michigan mammals are the papers issued by the museums of zoology at Michigan State University and the University of Michigan.

A special index in this field is the set of:

U.S. Fish and Wildlife Service. Wildlife Abstracts: a bibliography and index of the abstracts in Wildlife Review. no.1- , 1935/51- . Washington: GPO, 1954. SK351.U52

Wildlife Review. no. 67- , June 1952- . Quarterly.

Issued in 1935 by the U.S. Interior Department of Fish and Wildlife Service, and since 1952 by the U.S. Sport Fisheries and Wildlife Bureau.

Periodicals with a special emphasis on wildlife and specifically the mammals of Michigan are:

Michigan Academician. v.1- , 1969- . Ann Arbor: Michigan Academy of Sciences, Arts and Letters. Supersedes the Academy's earlier Papers and Reports which have been published since 1900- .

Michigan Natural Resources. v.1- , 1931- . Lansing: Michigan Department of Natural Resources. Bimonthly. Formerly: Michigan Conservation.

Ontario Fish and Wildlife Review. v.1- , 1961- . Toronto: Ontario Ministry of Natural Resources. Quarterly. Indexed in Biological Abstracts.

Ontario Naturalist. v.1- , 1963- . Don Mills, Ontario: Federation of Ontario Naturalists. 5/year. Incorporating the Federation's Newsletter.

Societies and agencies that are especially concerned with the distribution and welfare of mammals are:

Dearborn Naturalist Association

Federation of Ontario Naturalists

Michigan Academy of Science, Arts and Letters

Michigan Audubon Society

Michigan Natural Areas Association

Michigan Nature Association

Michigan United Conservation Clubs

National Wildlife Federation - Michigan Branch

Sierra Club - Michigan Branch

Additional materials are located under "Mammals" and "Mammals--Geographical Distribution" in the subject catalog. With mammals in particular, family and species name will usually provide sources in the catalog, as well as common names, such as "Bats" and "Foxes" (things tend to be classed by the plural of the word). The Library of Congress classification numbers span ZL701 to ZL739 for mammals and Z7991-7999 for bibliographies on zoological topics.

Phylum - Chorcata

Class - Mammalia

Order Family Genus - popular name

Artiodactyla

Cervidae

Alces alces (Linneaus) Moose P (Protected)

Carnivora

Canidae

Canis lupus lycaon (Schreber) Eastern timber wolf

Urocyon cinereoargenteus (Schreber) Gray fox P

Felidae

Lynx canadensis (Kerr) Canada Lynx R

Mustelidae

Martes americana (Turton) Pine martin T

Taxidea taxus (Schreber) Badger R

Chiroptera (bats)

Vespertilionidae

Lasiurus cinereus (Palisot de Beauvois) Hoary bat

Myotis sodalis (Miller & Allen) Indiana bat E

Nycticeius humeralis (Rafinesque) Evening bat P

Pipistrellus subflavus Eastern pipistrelle P

Phylum - Chordata

Class - Mammalia

Order	Family	Genus - popular name	
Insectivora			
	Soricidae		
		Cryptotis parva (Say) Least shrew	T
		Microsorex hoyi (Baird) Hoy's pigmy shrew	R
		M. thomsoni (Baird) Thompson's pigmy shrew	R
		Sorex arcitcus (Kerr) Arctic shrew	R
		S. palustris (Richardson) Water shrew	R
Rodentia			
	Microtinae		
		Microtus ochrogaster (Wagner) Prairie vole	P
		M. pinetorum (Le Conte) Pine vole	T
		Synaptomys cooperi (Baird) Southern bog lemming	T

CHAPTER TEN
Plants

The definitive discussion to date of endangered plants in Michigan has been recently published in The Michigan Botanist.

Wagner, W.H., Fr., Voss, E.G., Beaman, J.H., Bourdo, E.A., Case, F.W., Churchill, J.A., and Thompson, P.A. "Endangered, Threatened, and Rare Vascular Plants in Michigan." Michigan Botanist. 16(1977):99-110.

Beaman, J.H. "Commentary on Endangered and Threatened Plants in Michigan." The Michigan Botanist. 16(1977):110-122.

Contains references, and charts plant distribution by county according to the most recent, valid surveys of Michigan vegetation.

Standard references to Michigan plants include:

Billington, Cecil. Ferns of Michigan. Cranbrook Institute of Science, Bulletin no. 32. Bloomfield Hills, MI, 1952. Q11.C95 n.32

_____. Shrubs of Michigan. Cranbrook Institute of Science, Bulletin no. 20. Bloomfield Hills, MI, 1968.

Smith, Helen V. Michigan Wildflowers. Cranbrook Institute of Science, Bulletin no. 42. Bloomfield Hills, MI, 1961.

Voss, Edward G. Michigan Flora: a guide to the identification and occurrence of the native and naturalized seed-plants of the state. Part 1: Gymnosperms and monocots. Cranbrook Institute of Science and the University of Michigan Herbarium. Bloomfield Hills, MI 1972.

Introduction includes history of floristic observation in Michigan, location of herbaria in the state and relevent out-of-state collections. Bibliography refers to documented collections, which are useful for recording plant distribution.

The body of the book (Voss) includes a taxonomic discussion of specie characteristics and provides a county-by-county diagram of distribution. Subsequent volumes will cover dicots. All distribution notes are documented to either herbarium material or published records.

Specialized information on Michigan herbaria can be located easily through Voss' Michigan Flora (pages 9-14), and:

Lanjouw, Joseph, and Stafleu, F.A. Index Herbariorum: a guide to the location and contents of the world's public herbaria. Utrecht, 1954- .

Volume one lists herbaria by city; v.2 is an alphabetical listing of botanists.

Lanjouw includes a directory of famous botanic collectors, their specialized areas of collecting, and the location of their specimens. Biographical information on botanists is also listed in:

The New York Botanical Garden. Biographical Notes Upon Botanists. compiled by John Hendley Barnhart. 3v. Boston: G.K. Hall, 1965. QK23.83

Further retrospective material on the distribution of rare plants in Michigan is listed in the following books and articles. The footnotes and bibliographies included in each citation network into other sources.

Beal, W.J. "Flora of Michigan." Michigan Academy of Science. Fifth Annual Report. 1904.

This is the first attempt at a complete listing of the flora located in Michigan. For years after the release of this article, publications of "Additions to Beal's..." appeared.

Blake, S.F., and Atwood, Alice. Geographical Guide to Floras of the World. 1943. (Reprinted New York: Hafner Publishing Co., 1963) Z5358.A12.B53

Based on the holdings of the National Agricul-

tural Library. Includes periodical articles as well as monographs. Three pages of citations with annotations are offered under "Michigan."

Fitgerald, Sue, and Bailey, Robert E. "Vegetational Characteristics of a Circum-Neutral Bog, Barney's Lake, Beaver Island, Michigan." The Michigan Academician. v.7.(Spring 1975).

There are several specialized indexes to the literature of botany, but they emphasize the economic and international aspects of plants. It seems that the location of floral distribution reports is more easily accessed through the references located at the end of articles on a similar theme. The periodicals most likely to contain such articles would include:

Botanical Gazette: a journal embracing all departments of botanical science. v.1- , 1875- . University of Chicago Press. Quarterly.

Indexed in Biological Abstracts.

Michigan Academician. v.1- , 1969- . Ann Arbor: Michigan Academy of Science, Arts and Letters. Supersedes the Academy's earlier Papers and Reports.

Likely source for botanic articles of local interest, particularly pre-1962, before the emergence of the Michigan Botanist.

Michigan Botanist. v.1- , 1962- . Ann Arbor: Michigan Botanical Club. Quarterly.

The local societies and agencies with especial interest in endangered and rare species of plants in Michigan would include:

Dearborn Naturalist Association

Federated Garden Clubs of Michigan

Federation of Ontario Naturalists

Michigan Botanical Club

Michigan Natural Areas Association

Michigan Nature Association

Wildflower Preservation Society

The subject term access to materials on botany in a card or book subject catalog is straight-foreward to "Botany--Michigan." All the Library of Congress numbers under "QK" relate to botany. and bibliographies are located from Z5351 to A5360.

I have deferred displaying the 303 species of plants on the endangered, threatened and rare species list, as they have already been published in systematic order by the technical committee, most recently in The Michigan Botanist, v.16, 1977 (see earlier citation).

SECTION THREE

CHAPTER ELEVEN
Associations and Agencies

The selected agencies and associations that appear in this chapter were chosen from the following directories:

Conservation Directory, 1976. A list of organizations, agencies and officials concerned with natural resource use and management. 21st ed. Gloria H. Decker, ed. Washington, DC: National Wildlife Federation, 1976. (abbreviated as cd)

Encyclopedia of Associations. Margaret Fisk, ed. 11th ed. 3 vols. Detroit: Gale Research Co., 1977. (ea)

Environment U.S.A. A guide to agencies, people, and resources. compiled and ed. by the Onyx Group, Inc. New York: R.R. Bowker Co., 1974. (eu)

Environmental Information Sources Handbook. Garwood R. Wolff, ed. New York: Simon and Schuster, 1974. (ei)

Kruzas, Anthony T. and Linda E. Sullivan. Encyclopedia of Governmental Advisory Organizations. 2nd ed. Detroit: Gale Research Co., 1975. (eago)

Kruzas, Anthony T. Encyclopedia of Information Systems and Services. 2nd Intl. ed. Ann Arbor: Anthony T. Kruzas Associates, 1974. (eiss)

Research Centers Directory. 5th ed. by Archie Palmer. Detroit: Gale Research Co., 1975. (rcd)

TIP: The Information Place. Resource file at the Detroit Public Libraries. (313) 833-4000 (tip)

Ulrich's International Periodicals Directory: a classified guide to current periodicals, foreign and domestic. 16th ed. New York: R.R. Bowker Co., 1975. (u)

U.S. Dept. of Commerce. National Oceanic and Atmospheric Admin. List of Fishery Associations in the U.S., 1969-70. Leaflet 634. National Marine Fisheries Service, 1971. (f)

World Directory of Environmental Research Centers. 2nd ed. Sponsored by Lake Erie Environmental Studies Program (LEES). Scottsdale, AZ: Oryx Press, 1974. (wd)

American Society of Icthyologists and Herpetologists (cd)
c/o Dr. Bruce Collette
National Marine Fisheries Service
U.S. National Museum
Washington, DC 20560
"To advance the science of the study of fish, amphibians and reptiles."

Association of Midwest Fish and Game Commissioners (ei)
P.O. Box 1028
Pratt, KS 67124
Membership from 15 states and 2 provinces. Publishes Proceedings.

Big Bay De Noc Fishermans Association (f)
c/o A. LaVallee, Sec.
Garden, MI 49835

Center for Lake Superior Environmental Studies (article)
University of Wisconsin , Superior
Superior, WI

Dearborn Naturalist Association (tip)
U-M Dearborn Campus
4901 Evergreen
Dearborn, MI 48218

Detroit Area Coalition for the Environment (article)
4866 Third, Rm. 100
Detroit, MI 48201
(313) 577-3480
Founded in 1971. Publishes Earth Watch (newsletter), monthly.
Emphasis is on urban ecology.

East Michigan Environmental Action Council (eu)
912 S. Woodward
Birmingham, MI 48011
(313) 642-1866
Founded in 1971. Publishes Target: Earth.

Federated Garden Clubs of Michigan
Address unknown.

Federation of Ontario Naturalists (u)
1262 Don Mills Rd.
Don Mills, ON, Canada
Publishes Ontario Naturalist, 5/year.

Fisheries Council of the Great Lakes (f)
c/o Arthur Salasneck, Pres.
33 Vernier Rd.
Grosse Pointe Shores, MI 48236

Governor's Wilderness and Natural Areas Advisory Council (article)

Established by Gov. Milliken. At least three member-advisors represent the Michigan Natural Areas Association

Great Lakes Basin Commission (eago)
P.O. Box 999
Ann Arbor, MI 48106
(313) 769-7431
Frederick O. Rouse is chairman. Publishes Communicator (newsletter) monthly; Great Lakes Basin Framework Study, 17 vols, 1975; and various study reports and brochures. Has 20 advisory members.

Great Lakes Commission (u)
Institute of Science and Technology Bldg.
2200 Bonisteel Blvd.
Ann Arbor, MI 48105
Publishes Great Lakes News Letter, bimonthly; and Checklist: a bibliography of Great Lakes research, semiannually.

Great Lakes Fishery Commission (eago)
1451 Green Rd., P.O. Box 640
Ann Arbor, MI 48107
(313) 662-3209
A.L. McLain, exec. sec. Cooperative agency with Canada to formulate and coordinate research programs in the Great Lakes. Same location for the U.S. Fish & Wildlife Service, and Great Lakes Fishery Laboratory.

Great Lakes Fishery Laboratory
See Great Lakes Fishery Commission

Great Lakes Foundation (u)
3750 Nixon Rd.
Ann Arbor, MI 48106
Publishes LIMNOS.

Great Lakes Institute (rcd)
c/o University of Toronto
Toronto 181 Ontario, Canada
(416) 928-2995
Operates research station at Baie du Dore on Lake Huron.

Great Lakes Laboratory (rcd)
5 Porter Ave.
State University college at Buffalo
Buffalo, NY 14201
(716) 862-5422
Researches pollution effects in the Great Lakes; sponsors Graduate Institute in Aquatic Environmental Studies. Publishes Gill Reports, irregularly.

Great Lakes Research Division (rcd)
Institute of Science and Technology
University of Michigan
Ann Arbor, MI 48105
(313) 764-6200
Same address as Great Lakes Commission. Maintains two research vessels. Formerly known as: Great Lakes Research Division.

Human Environment House (eu)
6634 N. Westnedge
Kalamazoo, MI 49001
(616) 382-5694
Founded in 1970. Acts as the environmental arm of the Kalamazoo Nature Center.

Institute for Fisheries Research (rcd)
212 Museums Annex
University of Michigan
Ann Arbor, MI 48104
(313) 663-0222
Dr. W.C. Latta, dir. Unit of the Michigan Dept. of Natural Resources. Affiliated with Michigan State University and the University of Michigan.

Lake Erie Cleanup Committee (cd)
3033 11th St.
Monroe, MI 48161

Lake Erie Environmental Studies Program (LEES) (wd)
Graduate Sudies and Research
State University of New York at Fredonia
Fredonia, NY
Morgan D. Dowd, Dean. Has published the World Directory of Environmental Research Centers.

Lake Michigan Federation (?)
53 W. Jackson Blvd.
Chicago, IL 60604
(312) 427-5121

Lake St. Clair Advisory Committee (tip)
33134 N. River Rd.
Mt. Clemens, MI 48043

Lake Superior Commercial Fishermen's Association (f)
c/o Roy Koski, Sec.-Treas.
Aura, MI 49906

Lake Superior Tomorrow (article)
c/o Institute of Environmental Studies
Northland College
Ashland, WI

Menominee County Fishermens Association (f)
c/o Alex Strand, Sec.
Star Route
Menominee, MI 49858

Michigan Academy of Science, Arts and Letters (u)
Tuomy House
2117 Washtenaw Ave.
Ann Arbor, MI 48104
Publishes the Michigan Academician, quarterly.

Michigan Audubon Society (per. phone call)
7000 N. Westnedge
Kalamazoo, MI 49001
Publishes Jack-Pine Warbler, quarterly. There are several dozen other Michigan chapters that can be located through the National Audubon office. The Detroit Audubon Society publishes Flyway, a bimonthly publication with a column on endangered species, penned by Tom Noderbart, chairman of the Endangered Species Committee of the Detroit Audubon (located at 303 W. 4th, Royal Oak, MI 313 545-2929).

Michigan Bass Chapter Federation (cd)
c/o Paul Lackney, Pres.
6109 Rasberry Lane
Flint, MI 48507
(313) 234-5467
"Fishermen united to fight pollution."

Michigan Botanical Club (tip)
c/o Mrs. George Thomson (Thelma)
15093 Faust
Detroit, MI 48223
and alternative, permanent address:
c/o Malthaei Botanical Gardens
1800 Dixboro Rd.
Ann Arbor, MI 48105
Sponsors a Rare Plants Committee. Publishes The Michigan Botanist.

Michigan Department of Natural Resources
Mason Bldg.
Lansing, MI 48926
Sponsors Michigans Endangered and Threatened Species Program. Publishe Michigan Natural Resources, bimonthly.

Michigan Entomological Society (u)
c/o Dept. of Entomology
Michigan State University
East Lansing, MI 48823
Publishes Great Lakes Entomologist.

Michigan Fish Producers Association (f)
c/o Roy Jensen, Sec.
P.O. Box 62
Escanaba, MI 49829

Michigan Lake and Stream Associations (eu)
9610 E. Shore Dr.
Kalamazoo, MI 49002
(616) 317-3260
Founded in 1962. Federation of lake and stream associations. Publishes The Michigan Riparian, quarterly. Holds annual 2-day seminars.

Michigan Natural Areas Association
c/o the Michigan Botanical Club
Has an Endangered and Threatened Species Committee. Began in the 1940's as a committee of the Michigan Botanical Club, and now functions separately.

Michigan Nature Association (tip)
124 Miller
Mt. Clemens, MI 48043
(313) 468-1313

Michigan Student Environmental Confederation (eu)
409 Seymour St.
Lansing, MI 48933
(517) 484-7421
Founded in 1971. Publishes Michigan Earth Beat.

Michigan United Conservation clubs (tip)
2101 Wood, Box 2235
Lansing, MI 48911
(517) 371-1041
Thomas L. Washington, Exec.Dir. Organization of 360 sportsmen and conservation clubs, in 19 districts. Publishes Michigan Out-of-Doors, monthly.

Migratory Bird Conservation Commission (eago)
U.S. Dept. of the Interior
18th and C Sts., N.W.
Washington, DC 20240
(202) 343-4676
Walter R. McAllester, Sec. Founded in 1929 to consider and approve the purchase and rental of lands necessary for the protection of migratory birds.

National Audubon Society (cd)
950 Third Ave.
New York, NY 10022
(212) 832-3200

National Marine Fisheries Service
P.O. Box 648
Ann Arbor, MI 48107

National Wildlife Federation (cd)
Michigan representative
Paul H. Wendler
Saginaw, MI

Nature Conservancy (cd)
Michigan Field Representative
G.Rodney Miller
531 N. Clipper St., Suite F
Lansing, MI 48912
(517) 332-1741

Pictured Rocks National Lakeshore Advisory Commission (eago)
P.O. Box 40
Munising, MI 49862

Rare Bird Alert (tip)
(313) 893-8020
A 24-hour, dial-a-message exchange for rare bird sightings. Sponsored by the Audubon Society.

St. John's Marsh Fund (tip)
c/o Lake St. Clair Advisory Committee
33134 N. River Rd.
Mt. Clemens, MI 48043
To preserve 3,100 acres of marshland.

Sierra Club - Michigan branch (tip)
c/o Irving Salmeen
(313) 562-7995

Sleeping Bear Dunes National Lakeshore Advisory Commission (eago)
400 Main St.
Frankfort, MI 49635

U.S. Army Corps of Engineers (eiss)
STINFO (Scientific and Technical Information Division)
1000 Independence Ave., S.W.
Washington, DC 20314
(202) 693-6123
Margrett B. Zenich, Chief of Division. Sponsors the Endangered Species machine-readable data base.

U.S. Environmental Protection Agency (u)
Grosse Ile Laboratory
9311 Groh Rd.
Grosse Ile, MI 48138
Publishes Great Lakes Research Highlights, semiannually.

U.S. Fish and Wildlife Service
See Great Lakes Fishery Commission

West Michigan Environmental Action Council (cd)
822 Cherry, S.E.
Grand Rapids, MI 49506
(616) 451-3051

Wildflower Preservation Society (?)
3740 Oliver St., N.W.
Washington, DC 20015

Zoological Action Program (ZAP) (u)
P.O. 5114
Grosse Pointe, MI 48236
Publishes ZAP Raps, quarterly. Has been reported missing in the Encyclopedia of Associations since 1975.

CHAPTER TWELVE
Michigan College Biology Departments

This listing of Michigan University and College Biology Departments was compiled with the aid of one directory and updated by the individual college catalogues. It is included in this paper in an attempt to identify the location and nature of university-sponsored field records kept on local flora and fauna. The directory used is:

American Institute of Biological Sciences. Directory of Bio-Science Departments in the U.S. and Canada. New York: Reinhold, 1967. QH319.A5A52

College Cat. Update

Adrian College Adrian, MI 49221 (313) 265-5161 (75-77)
Biology Department Chairman: Dr. R.W. Husband

Features: Herbarium; Peter Dawson Arboretum
Field Courses: Local Flora; Ecology Laboratory; Vertebrate Biology; Field Entomology; Ornithology; etc.

Albion College Albion, MI 49224 (517) 629-5511 (76-77)
Department of Biology Chairman: Dean G. Dillery

Features: Herbarium; Harvey N. Ott Biological Preserve; Whitehouse Nature Center
Field Courses: Invertebrate Field Zoology; Vertebrate Field Zoology; Ornithology; Botany; etc.

Alma College Alma, MI 48801 (517) 629-2141 (76-77)
Biology Department Chairman: A.L. Edgar

Features: Herbarium; Alma College Ecological Station
Special Courses: Spring Flora of the Southern Great Lakes Region; Birds of the Great Lakes Region; Aquatic Biology; Field Studies; etc.

Andrews University Berriensprings, MI 49104 ( ) 471-7771 (76-77)
Department of Biology Chairman: A.C. Thoresen

Features: Marine Biological Station in Washington State
Special Courses: Field Ornithology; Mammalogy; Entomology; etc.

Aquinas College Grand Rapids, MI 49506 (616) 499-8281 (76)
Department of Biological Science Chairman: Sr. B. Hansen

Features: Herbarium
Field Courses: Nature Study

(76-77)

Central Michigan University Mt. Pleasant, MI 48859 (517) 774-3151
Department of Biology Chairman: Lawrence D. Koehler

Features: Herbarium; Field Station on Beaver Island, MI
Special Courses: Field Ornithology; Field Biology; Wetland Ecology
Plant Ecology (Field); Dendrology; Nature Photography; etc.

Eastern Michigan University Ypsilanti, MI
Unable to locate materials.

Ferris State College Big Rapids, MI 49307 (616) 796-9971
Department of Biology Head: R.E. Friar

Special Courses: Natural History of Vertebrates; Natural History of
Invertebrates; Entomology; Field Botony

Grand Valley State College Allendale, MI 49401 (616) 895-6611
Department of Biology Chairman: H.J. Stein

Emphasis on microbiology rather than field work.

Hillsdale College Hillsdale, MI 49242 (517) 437-4341
Department of Biology Chairman: J. Catenhusen

Features: Slayton Arboretum

Hope College Holland, MI 49423 (616) 392-5111
Department of Biology Chairman: E.D. Greij

Features: Hope College Field Station, Holland, MI

Kalamazoo College Kalamazoo, MI 49001 (616) 343-1551 (76-77)
Department of Biology Chairman: A.W. Wiens

Special Courses: Entomology; Ornithology; Biology of Higher Plants

Lake Superior State College Sault St. Marie, MI 49883 (75-77)
Department of Biological Sciences Head: B.E. Smith
(In the School of Science and Technology)

Special Courses: Field Botany; Entomology

(76)
Michigan State University East Lansing, MI 48823 (517) 355-1855
College of Natural Sciences Dean: Richard Byerrum
Department of Botany Chairman: Fred Tschirley
Department of Entomology Chairman: James Bath
Department of Zoology Chairman: James Butches
Kellogg Biology Station Director: George Lauff
Biology Research Center Director: Martin Balaban

Features: Herbarium; Kellogg Biological Station at Hickory Corners, Kellogg Bird Sanctuary; Kellogg Gull Lake Laboratories; Museu
Special Courses: Too numerous to list

(76-77)
Northern Michigan University Marquette, MI 49855 ( ) 227-1000
Department of Biology Head: L.E. Peters

Features: Field Station in Melstrand, MI; Herbarium
Special Courses: Herpetology; Ornithology; Mammalogy; Entomology; Invertebrate Zoology; etc.

Olivet College Olivet, MI 49076 (76-77)

Features: Herbarium
Special Courses: Ornithology; Entomology; Invertebrate Zoology; etc.

Michigan Technical University Houghton, MI (906) 487-1885 (77-79)
Department of Biological Sciences Head: R.C. Stones
Department of Forestry Head: B.A. Hesterberg

Features: Herbert Dow Wilderness Area in Keweenaw Peninsula
Special Courses: Fishery Biology; Freshwater Invertebrates; Field Botany and Ecology

(73-74)
Muskegon Community College Muskegon, MI 49443 (616) 773-9131

Features: Herbarium

Wayne State University Detroit, MI 48202 (313) 577-2424 (77)
Department of Biology Chairman: A. Siegel

Features: Herbarium
Special Courses: Field Investigations in Biology; Ornithology; Ichthyology; Insect Biology Distribution and Behavior; Mammalogy; etc.

University of Michigan Ann Arbor, MI 48104 (313)764-1817 (76-77)
Department of Biological Sciences Chairman: Dr. Dawson
School of Natural Resources Dean: James T. McFadden (Chairman vacant)
Pellston Biological Station Director: D.M. Gates

Features: Herbarium; Biological Station in Pellston; Camp Filbert Roth in Ottawa National Forest; Arboretum; Museum of Natural Science; Stinchfield Woods
Special Courses: Too numerous to list

(76-77)
Western Michigan University Kalamazoo, MI 49001 (616) 383-1600
Biology Department Acting Chairman: Pippen

Features: Herbarium
Special Courses: Field Natural History; Invertebrate Zoology; Entomology; Ornithology; Ecology of Southwestern Michigan; etc

CHAPTER THIRTEEN
Michigan Natural Science Centers

The location of these centers was primarily guided by two directories:

Audubon Society. Nature Center Planning Division. Directory of Nature Centers and Related Environmental Education Facilities. New York: Audubon Society, 1975.

Natural Science Centers 1975-76. New Canaan, CT: Natural Science for Youth Foundation.

Alma Outdoor Center Alma Public Schools Alma, MI 48808
(313) 463-1389

(John) Ball Zoological Gardens 301 Market, S.W. Grand Rapids, MI 49502
(616) 451-0791
Mary Roth, Zoologist; Frederick A. Meyer, Zoo Director

Belle Isle Nature Center Detroit, MI
(313) 824-6077

Belleville Nature Center 17845 Savage Rd. Belleville, MI 48111
(313) 697-9181 (part of Huron-Clinton Metro-Parks)

Camp Tamarack Ortonville, MI 48462
Barnet Brown, Outdoor Education Consultant

Center for Cultural and Natural History 307 Ronan Mt.Pleasant, MI 48859
(517) 774-3829
Lynn N. Fauver, Director

Chippewa Nature Center 376 S. Badour Rd., Route 9 Midland, MI 48640
(517) 631-0830
Fel V. Brunett, Douglas Moor, Naturalists

Constantine Public Schools 260 W. 6th St. Constantine, MI 49042

Cranbrook Institute of Science, Nature Center 500 Lone Pine Rd.
Bloomfield Hills, MI 48013
(313) 644-1600
Johathan Schechter, David Radcliffe, Naturalists
Robert Bowen, Director; Wayne S. Koser, Naturalist

Dexter Community Schools 3173 Baker Rd. Dexter, MI 48130
(313) 426-3991
Timothy Speyer, Conservation Consultant

DeWaters Education Center 5360 E. Potter Rd. Flint, MI 48506
(313) 743-8951
Janeen A. Wolgast, Park Naturalist

Drayton Plains Nature Center 2125 Denby Dr. Drayton Plains, MI 48020
(313) 674-2119
Michael Van Gordon, Naturalist

Carl G. Fenner Arboretum and Environmental Education Center
2020 E. Mt. Hope Lansing, MI 48910
(517) 489-1686
Joan Brigham, Naturalist; Bobbie Hinkle, Assistant

Fernwood 1720 Range Line Rd. Niles, MI 49120
(616) 695-6491
Kay Boydston, Director

Fish Lake Environmental Education Center
See Kresge Environmental Education Center

For-Mar Nature Preserve and Arboretum G-2252 N. Genesse Rd. Flint, 48
(313) 736-7100
Dennis B. Zawol, Naturalist/Director

Grand Rapids Public Museum 54 Jefferson Ave., S.E. Grand Rapids, 4950:
(616) 456-5494
W.D. Frankforter, Director; Dr. Mary Jane Dockeray,
Curator of Natural History
Operates the Blandford Nature Center; Chadwick Garden Center

Greenwood Energy/Environmental Center (located in Port Huron)
c/o Detroit Edison 2000 2nd Ave. Detroit, MI 48226

Hidden Lake Gardens Tipton, MI 48287
(313) 431-2060
Operated by Michigan State University.

Isle Royale National Park 87 N. Ripley St. Houghton, MI 49931
(906) 482-3310
Operated by the National Park Service.

Kalamazoo Nature Center 7000 N. Westnedge Ave. Kalamazoo, MI 49007
(616) 381-1574
Dr. H. Lewis Batts, Jr., Exec. Director

Kellogg Bird Sanctuary 12685 C Ave., E. Route 1, Box 339 Augusta, 490
(616) 671-5721
Operated by Michigan State University.

Kensington Metro-Park Nature Center 2240 W. Buno Rd. Milford, MI
(313) 685-2417
Patricia L. Eising, Park Naturalist

Kresge Environmental Education Center (Formerly Fish Lake Environmental Educational Center) 2816 Fish Lake Rd. Lapeer, 48466
(313) 664-1461
Frank Sinclair, Director

Lapeer Public Schools - Skinner Lake Lapeer, MI 48446
(313) 664-4581
Mike Supernault, Environmental Education Director

Michigan Haven Hill Natural Resource Environmental Education Center
Highland Township, North of Milford
( ) 887-5160

The Museum Michigan State University East Lansing, MI 48824
(517) 355-2370
Dick Gringhuis, Curator; Rollin H. Baker, Director

Nankin Mills Nature Center 33175 Ann Arbor Trail Westland, MI 48185
(313) 261-1876
Mary C. Ellsworth, Park Naturalist

Neithercut Interpretive Ecology Center Mt. Pleasant, MI 48858
(517) 774-3009

Outdoor Education Center Battle Creek Public Schools Dowling, MI 49050
(616) 721-8161
Jack N. Wykoff, Director

Pictured Rocks National Lakeshore P.O. Box 40 Munising, MI 49862
Operated by the National Park Service.

Rouge Park Nature Center 14250 Outer Drive Detroit, MI 48239
(313) 538-6088
Wolfgang Mattes, Naturalist

Sarett Nature Center Route 2, Box 217 Benton Center Rd.
Benton Harbor, MI 49022
(616) 927-4832
Operated by Michigan Audubon Society.

Scenic Trails Council Scouting, U.S.A. 2308 U.S. 31 N. Traverse City MI 49684
(616) 946-7910
Martin Melkild, Curator; Joe Groszek, Scout Exec.
Formerly known as The BoyScouts of America.

School Program Project Conservation and Outdoor Education
2555 S. State Ann Arbor, MI 48104
(313) 665-7711

Seney National Wildlife Refuge Star Route Seney, MI 49883
(906) 586-6504
Edward C. Murczek, Refuge Manager

Seven-Pounds Nature Center 3854 Crawford Rd Dyden, MI 48428
Donald Naish, Director
Education center of the Michigan Audubon.

Simonds Woods 30000 Rose Ave. Madison Heights, MI 48071
(313) 588-5400

Southfield Recreation Center (Formerly Civic Center Natural Area)
26000 Evergreen Rd. Southfield, MI 48076
(313) 354-9603
Laurence Shenk, Director, Parks and Recreation

Stony Creek Nature Center 4100 Inwood Rd. Romeo, MI 48065
(part of the Huron-Clinton Metro Authority)
(313) 781-4621
Roger Bajorek, Thomas Smith Naturalists

Sylvania Visitor Center Ottawa National Forest Watersmeet, MI 49969
(906) 358-4724
Walter W. Wintuchi, Jr., Informtion
Operated by the Forest Service.

Union City Forest and Wildlife Area Union City, MI 49094
(517) 741-4221

Whitehouse Nature Center S. Hanna St. Whitehouse, MI 49224
(517) 629-5511
Operated by Albion College.

Willis C. & Mabel Lee Ward Nature Study Area 4700 Pontiac Trail
Orchard Lake, MI
(313) 644-1600
Operated by Cranbrook Institute of Science.

Woldmar Nature Center 5539 Lansing Rd. Lansing, MI 48917
(517) 372-4991
Jeffrey W. Klenk, Acting Director

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